ROCKY FLATS ... STER FILE

THE DOW CHEMICAL COMPANY

ROCKY FLATS DIVISION
P O BOX 888
GOLDEN COLORADO 80401

August 19 1970

L M Joshel

SUMMARY - DRUM FIELD ACTIVITY

From the beginning of operations of the Rocky Flats Plant certain organic liquids contaminated slightly with radioactive materials were generated which required disposal Little consideration was given to this in the initial design of the plant apparently based upon the assumption that these materials could be packaged and shipped for burial as were low-level solid wastes

Idaho Operations Office the agency responsible for the operation of the burial site however declined to accept these materials for burial except for a small quantity of wastes coming from uranium operations which were shipped in 1957

These facts led to the establishment in 1954 of a "burial mound' at a location southeast of Building 991 in the eastern portion of the plant site For the most part liquids contaminated with uranium either depleted or enriched were buried there but some drums containing plutonium contamination were also transferred to that location Records do not indicate that they were actually buried

Meanwhile the problems of permanent disposal and of increasing quantities were recognized and development studies were undertaken to determine a satisfactory method of disposing of all such liquids As a result of one study the Part IV addition to the plant included a high-speed centrifuge in Building 776 to process plutonium-contaminated organic liquids It is not clear whether this was expected to produce a product suitable for "cold" disposal or not but in any case the operation was disappointing and resulted in a recommendation made in 1958 that a substitute process such as distillation be developed for disposal

REVIEWED FOR CLASSIFICATION
By R P Hoffman

ADMIN RECORD

REVIEWED FOR CLASSIFICATION/UCNI
By George H Sedlet
Date 7/3/90

A PRIME CONTRACTOR FOR THE U S ATOM C ENERG COMM SS ON CONTRACT AT(2

A-0002-000004

During those years the burning of uranium-contaminated oils had been tested as a disposal method and had been adopted as an acceptable method

Faced with the prospect of rising quantities of plutonium bearing oils the amount in the burial mound was moved south across the road to a fenced area in about July 1958 and when this area became filled a location east of this began to be used in October of ~~1960~~ The latter 1958 location subsequently became known as the "Drum Field " The additions to and deletions from the Drum Field are shown in the attached table based upon the best data available

Most of the drums transferred to the field were nominal 55-gallon drums but a significant number were 30-gallon drums Not all were completely full Approximately three-fourths of the drums were plutonium-contaminated while most of the balance contained uranium Of those containing plutonium most were lathe coolant consisting of a straight-chain hydrocarbon mineral oil (Shell Vitrea) and carbon tetrachloride in varying proportions Other liquids were involved however including hydraulic oils vacuum pump oil trichloroethylene perchloroethylene silicone oils acetone still bottoms etc Originally contents of the drums were indicated on the outside but these markings were made illegible through weathering and no other good records were kept of the contents Leakage of the oil was recognized early and in 1959 or possibly earlier ethanolamine was added to the oil to reduce the corrosion rate of the steel drums

As a result of the development studies which had been initiated however a recommendation was issued in December of 1959 that a still be constructed for the separation purification and reuse of the carbon-tetrachloride and the Shell Vitrea A process design was forwarded to Plant Engineering Because of time and funding problems this process was installed utilizing excess stainless equipment in Building 771. On May 15 1960 test runs on this equipment were begun and shortly afterward drums of currently generated oil together with some transferred from the field were processed through the system

Concurrently processes to dispose of the still bottoms from this operation and of other liquids were being pursued with incineration receiving the most favorable attention In this system the waste heat would be utilized to evaporate aqueous wastes which were also beginning to be a problem

In June of 1960 corrosion of the stainless equipment caused by hydrolysis of the CCl_4 to HCl began to be a problem and in September the operation was discontinued because of severe corrosion and the presence of ethanolamine in the product rendering it unsuitable for reuse

After additional development work a revised design was submitted to Engineering in December 1961 which incorporated changes to solve the known problems The project was included in the project 'Additional Processing Facilities Contract AT (29-2)-1298" which was an expansion of the plutonium chemical operation During this period development of a sludging process for disposing of the still bottoms and other wastes by mixing with an activated silica was also pursued In June 1963 information was received that the CCl_4 still had been deleted from the expansion project because of funding problems Because of this the design capacity of the sludging process was increased to provide for processing all contaminated liquids and funds for this project - based on a mixer-extruder system called the 'jelly factory" - were requested

Installation of the mixer-extruder system was completed in January, 1964 but start-up work revealed major deficiencies in the installation which required extensive modification These modifications were not completed until late in 1965

When this equipment was finally ready for operation a further delay was encountered when it was found that the condition of most of the drums in the oil field had deteriorated to the point of being completely unusable for transfer to the disposal plant even in the cart provided As a result FY-1966 expense funds were provided to build a temporary structure for transferring the oil into new drums while simultaneously filtering the oil through one-micron filters for plutonium removal and recovery

After more start-up problems the final phase of emptying the drum field began on January 23 1967 By this time the field contained about 5 240 drums of which approximately 3 572 contained plutonium contamination The oldest drums and those containing plutonium were processed first To the best of our knowledge the last of the plutonium was removed on January 25 1968 The last of the oil was transferred to a new drum on May 28 1968 and shipped to the disposal plant on June 5 1968

[illegible] 197[illegible]

Original estimates of plutonium content had indicated that the plutonium-bearing drums averaged about 4-5 grams of plutonium per drum. The material balance after processing, however, showed that less than half this amount was present. Of the plutonium found, only 594 grams* were recovered, 2471 grams** were processed with the oil, and 5152 grams*** remained in the emptied drums.

It has been estimated that 5,000 gallons of oil containing about 86 grams of plutonium leaked from the drums into the soil. 6 curies

Additional details of the history of the drum field can be found in the report "A Summary of On-Site Radioactive Waste Disposal," by E. A. Putzier, the files of E. S. Ryan of the Waste Disposal Coordinating Group, the files of M. E. Maas of Process Waste Treatment, and in the Library IRF records under DPA 94682, Recovery of Carbon Tetrachloride.

[signature]

K. W. Calkins

KWC:mma
Enc

cc
H. E. Bowman

Analyses of oil [illegible] 0.[illegible]1-0.3[illegible] g/liter

* [illegible] from 1µ filters [illegible] 9[illegible]3 [illegible] from 5µ filters [illegible] 77+

** Analysis of [illegible] case

*** By dr[illegible]

ca 70% of 5140 [illegible] Pu

SUMMARY - DRUM FIELD ACTIVITY

Calendar Year	Qtr	Drums Added	Drums Removed	Ending Inventory	Remarks
1958	4	91		91	First drum to Drum Field in October 1958
1959	1	163		254	Development work on CCl_4 still begun
	2	145		399	
	3	106		505	
	4	101		606	Design for CCl_4 still submitted for construction
1960	1	113		719	
	2	113	*	832	CCl_4 Still operation begun May 25 1960
	3	64	*	896	
	4	95		991	CCl_4 Still operation discontinued because of ethanolamine
1961	1	79		1070	
	2	129		1199	
	3	185		1384	
	4	158		1542	Cost estimate and flow sheet submitted for improved Still design
1962	1	320	**	1862	
	2	264	**	2126	Investigation of disposal by sludging begun

* Some drums removed for operation of oil still Bldg 771 Number shown as Added is approximately net

** [illegible] Number shown as Added is approximately net

SUMMARY - DRUM FIELD ACTIVITY (CONTINUED)

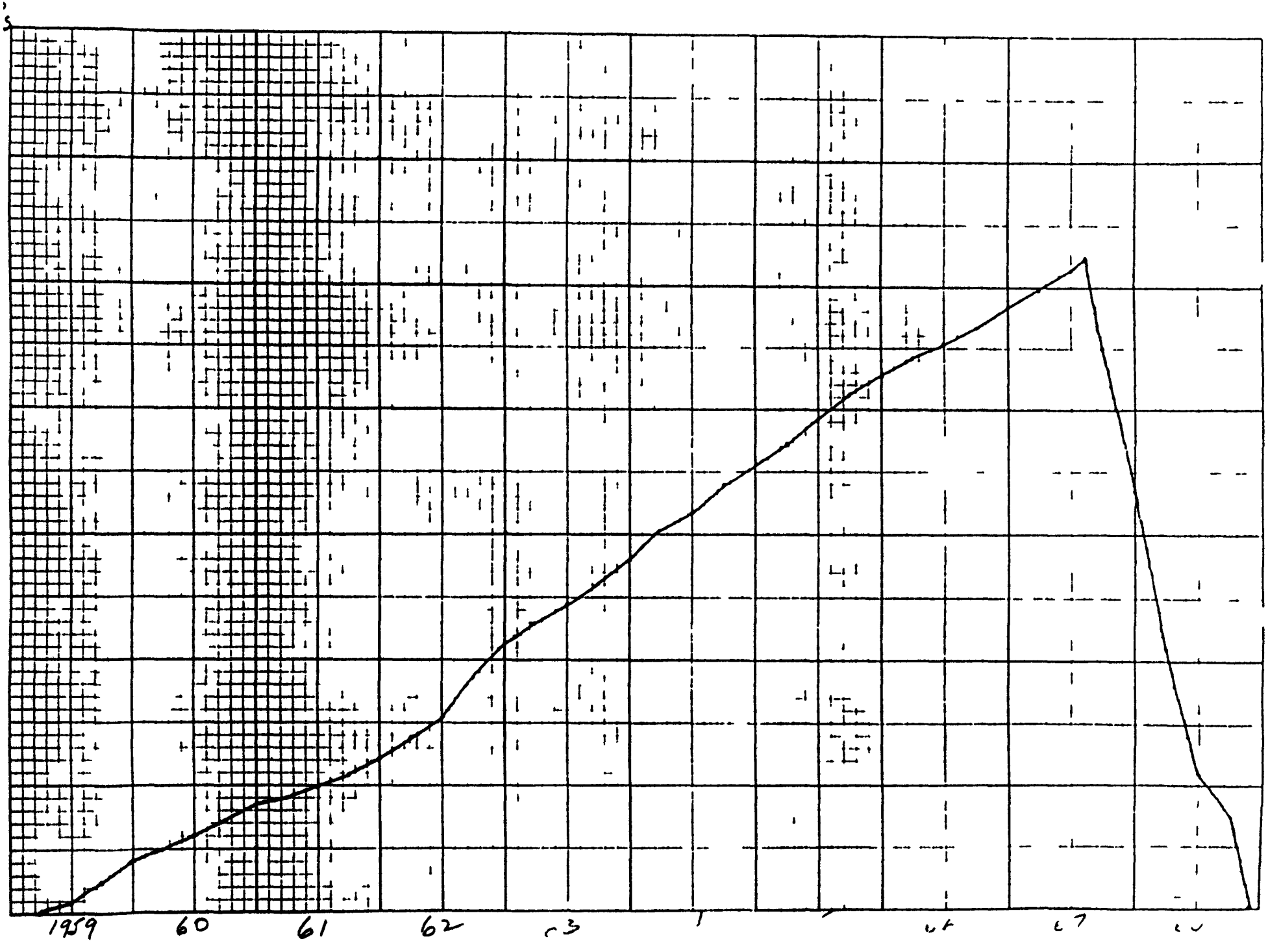
Calendar Year	Qtr	Drums Added	Drums Removed	Ending Inventory	Remarks
1962	3	169		2295	
	4	161	**	2456	
1963	1	164		2620	
	2	177	**	2797	Distillation equipment deleted from proje Mixer-Extruder for sludging requested
	3	222	**	3019	
	4	166	**	3185	
1964	1	208	**	3393	Installation of mixer-extruder completed "Cold" tests begun
	2	163		3556	
	3	169	**	3725	Testing reveals modifications of mixer extruder required
	4	199		3924	
1965	1	196		4120	
	2	167	**	4287	
	3	128		4415	
	4	121		4536	

** Possibly [illegible] only not

SUMMARY - DRUM FIELD ACTIVITY (CONTINUED)

Calendar Year	Qtr.	Drums Added	Drums Removed	Ending Inventory	Remarks
1966	1	137		4673	
	2	167		4840	
	3	150		4990	
	4	150		5140	
1967	1	100	737	4503	Removal begun Jan 23 1967 Inventory 5240
	2		1132	3371	
	3		1264	2107	
	4		1012	1095	
1968	1		357	738	Last of 3572 drums containing Pu removed Jan 25 1968
	2		738	0	Last drum removed June 5 1968

** Possibly some removals from drum field for burning Number shown as added is approximately net


1959
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